

REMARKS

The Applicants and the undersigned thank Examiner Rizk for a careful review of this application. Consideration of the present application is respectfully requested in light of the following remarks.

Status of the Claims

Claims 1-20 are pending in the present application, with Claims 1, 8, 11, and 14 being independent. The Applicants have amended Claims 1, 2, 7, 8, 11, 13, 14, 16, 19, and 20 herein. The amendments to the claims are fully supported by the specification and do not include new matter.

Unless explicitly stated otherwise, none of the amendments to the claims were made for reasons substantially related to the statutory requirements for patentability. Furthermore, unless otherwise stated, the amendments to the claims were made simply to make express that which had been implicit in the claims as originally worded and therefore are not narrowing amendments that would create any prosecution history estoppel.

Claim Rejections

In the Office Action, the Examiner rejected Claims 1-4 under 35 U.S.C. § 102(b) as allegedly being anticipated by U.S. Patent No. 5,621,764 to Ushirokawa et al. (hereinafter “Ushirokawa”). The Examiner rejected Claims 11-14 under 35 U.S.C. § 102(e) as allegedly being anticipated by U.S. Patent No. 7,340,185 to Ramanujam et al. (hereinafter “Ramanujam”). The Examiner rejected Claims 5-10 and 15-20 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Ushirokawa in view of Ramanujam. The Applicants respectfully traverse all of the foregoing rejections.

A. Independent Claim 1 is distinguishable over Ushirokawa.

The Applicants submit that Ushirokawa fails to teach, suggest, or make obvious at least the feature of a plurality of soft-decoders, each soft-decoder operable to sample the received signal at a different time within a symbol period and to output two values for each sample, the

first value comprising a preliminary decoded value and the second value comprising an ambiguity indicator as recited in amended Claim 1. In the Office Action, the Examiner asserts that the reliability information production circuits of Ushirokawa's Figure 9 disclose the soft-decoders of Claim 1. The Applicants respectfully disagree.

As the Applicants understand, the reliability information production circuits of Ushirokawa produce reliability information from demodulation process information provided by a demodulator. See Ushirokawa, Col. 8, lines 14-26. However, Ushirokawa does not disclose that the reliability information production circuits sample a received signal at a different time within a symbol period or that the reliability information production circuits output two values for each sample, the first value comprising a preliminary decoded value and the second value comprising an ambiguity indicator. Instead, the reliability information production circuits of Ushirokawa merely produce reliability information from demodulation process information. See Ushirokawa, Col. 8, lines 14-26. Although Ushirokawa states that the reliability information production circuits are included in a time-varying reliability information production circuit, Ushirokawa does not disclose that the reliability information production circuits sample a received signal at a different time within a symbol period. See Ushirokawa, Col. 8, lines 11-26. Accordingly, Ushirokawa fails to teach or suggest at least the feature of a plurality of soft-decoders, each soft-decoder operable to sample the received signal at a different time within a symbol period and to output two values for each sample, the first value comprising a preliminary decoded value and the second value comprising an ambiguity indicator as required by amended Claim 1.

In view of the above described differences between the invention of amended Claim 1 and the disclosure of Ushirokawa, the Applicants respectfully ask the Examiner to withdraw the pending rejection of Claim 1 and all claims dependent thereon, namely dependent Claims 2-7.

B. Independent Claim 8 is distinguishable over Ushirokawa and Ramanujam.

The Applicants submit that the documents cited by the Examiner fail to teach, suggest, or make obvious at least the feature of an asynchronous soft-decoder that continuously samples the received signal and produces a decoded output signal and an ambiguous indicator signal as

recited in amended Claim 8. In the Office Action, the Examiner asserts that Col. 3, lines 3-10 of Ramanujam disclose this feature. The Applicants respectfully disagree.

In the cited portion of Ramanujam, a dual stage detector is described. As Applicants understand, this dual stage detector of Ramanujam performs a dual stage detection of a transmitted signal by imparting different time delays to a received signal during a first stage, and comparing the time shifted signals to a plurality of decision thresholds during a second stage. See Col. 2, line 64 to Col. 3, line 2. The decision threshold stage of Ramanujam performs a comparison of the outputs of the time delay stage with a plurality of associated voltage thresholds and produces a digital output associated with each threshold. However, this dual-stage detector of Ramanujam is not an asynchronous soft-decoder and does not produce an ambiguous indicator signal as required by amended Claim 8. Instead, the dual stage detector of Ramanujam merely produces a digital output based on a comparison of time delayed outputs of a received signal to a voltage threshold. See Ramanujam, Col. 3, lines 11-18. This output is not and does not include an ambiguous indicator signal. Instead, the outputs of Ramanujam's dual stage detector are fed into a soft decoder that outputs a logic "1" or "0" depending on the probability that the time delay signal is a "1" or zero at the sample time. See Ramanujam, Col. 4, lines 45-67. Accordingly, the documents cited by the Examiner fail to teach, suggest, or make obvious at least the feature of an asynchronous soft-decoder that continuously samples the received signal and produces a decoded output signal and an ambiguous indicator signal as required by amended Claim 8.

In view of the above described differences between the invention of amended Claim 8 and the disclosure of Ramanujam, the Applicants respectfully ask the Examiner to withdraw the pending rejection of Claim 8 and all claims dependent thereon, namely dependent Claims 9-10.

C. Independent Claim 11 is distinguishable over Ramanujam.

The Applicants submit that Ramanujam fails to teach, suggest, or make obvious at least the feature of an analog-to-digital converter for sampling the received signal faster than once every symbol period of the received signal and outputting for each sample a first value comprising a preliminary decoded value and a second value comprising an ambiguity indicator

as recited in Claim 11. In the Office Action, the Examiner asserts that the splitter of Ramanujam's Figure 2 disclose the analog-to-digital converter of Claim 11. The Applicants respectfully disagree.

As the Applicants understand, the splitter of Ramanujam separates a received data signal onto separate paths. See Ramanujam, Col. 3, lines 4-6 and 42-48. However, Ramanujam's splitter does not include an analog-to-digital converter and does not output a decoded value or an ambiguity indicator as required by amended Claim 11. Further, Ramanujam does not disclose that the splitter samples a received signal faster than one every symbol period as required by amended Claim 11. Accordingly, Ramanujam fails to teach or suggest at least the feature of an analog-to-digital converter for sampling the received signal faster than once every symbol period of the received signal and outputting for each sample a first value comprising a preliminary decoded value and a second value comprising an ambiguity indicator as required by amended Claim 11.

In view of the above described differences between the invention of amended Claim 11 and the disclosure of Ramanujam, the Applicants respectfully ask the Examiner to withdraw the pending rejection of Claim 11 and all claims dependent thereon, namely dependent Claims 12-13.

D. Independent Claim 14 is distinguishable over Ramanujam.

The Applicants submit that Ramanujam fails to teach, suggest, or make obvious at least the feature of estimating an optimal timing offset on a symbol-by-symbol basis as recited in Claim 14. In the Office Action, the Examiner rejected Claim 14 for the same reasons as Claim 11.

However, Ramanujam does not disclose estimating an optimal timing offset on a symbol-by-symbol basis. Instead, Ramanujam decodes a received signal by splitting a signal into separate paths and imparting a time delay to the signal on each path. See Ramanujam, Col. 3, lines 4-10. Then, Ramanujam compares each signal with a plurality of thresholds and outputs a digital signal based on the comparisons. See Ramanujam, Col. 3, lines 11-18. These outputs are then used by a soft decoder to output a logic "1" or "0" based on the digital signals. See

Ramanujam, Col. 64-67. Thus, Ramanujam does not estimate an optimal timing offset and instead produces an output based on a plurality of threshold comparisons. Accordingly, Ramanujam fails to teach or suggest at least the feature of estimating an optimal timing offset on a symbol-by-symbol basis as required by Claim 14.

In view of the above described differences between the invention of Claim 14 and the disclosure of Ramanujam, the Applicants respectfully ask the Examiner to withdraw the pending rejection of Claim 14 and all claims dependent thereon, namely dependent Claims 15-20.

E. The Dependent Claims Further Define the Present Invention over the Cited Art.

Each of Claims 2-7, 9-10, 12-13, and 15-20 is dependent upon one of the independent claims discussed above. Accordingly, at least for the reasons described above, the Applicants submit that Claims 2-7, 9-10, 12-13, and 15-20 are likewise patentable over the cited documents. Moreover, the dependent claims recite additional features and combinations of features further distinguishing over the cited art. The Applicants request separate and individual consideration for each dependent claim.

As an example of such distinguishing features, Claim 2 recites that the soft-decoders are substantially identical to one another. However, Ushorikawa suggests that the reliability information production circuits, in which the Examiner likens to the soft decoders of Claim 1, employ a plurality of reliability production methods. See Ushorikawa, Col. 8, lines 14-26. Thus, the Applicants submit that the documents cited by the Examiner fail to teach or suggest this feature.

In view of the above, the Applicants kindly ask the Examiner to issue an allowance of all the pending claims.

CONCLUSION

The Applicants submit the foregoing as a full and complete response to the Official Action dated October 19, 2009. To the extent that the Examiner believes the Applicants have not addressed each specific point the Examiner has raised or each specific rejection of every independent and dependent claim, the Applicants submit that this paper shows that the independent claims, and thus the claims depending therefrom, are allowable over the cited references. The Applicants have not acquiesced to any rejection or point raised by the Examiner and reserve the right to address the patentability of any additional claim features in the future.

The Applicants submit that this application is in condition for allowance and courteously request for the Examiner to issue a Notice of Allowance. If any issues exist that can be resolved with an Examiner's Amendment or a telephone conference, please contact the undersigned at 404/572-3486 in Atlanta, Georgia.

The accompanying papers are believed to address any and all fees that may be due in this case, including any fees required for consideration of this paper and entry of the amendment. However, should the Commissioner deem that any additional fees (including any fees for extensions of time) or credits are due, the Commissioner is authorized to debit such fees from, or to credit any overpayments to, USPTO Deposit Account No. 11-0980, Ref. No. 07982.105019.

Respectfully submitted,

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